

REMARKS

This is in response to the Office Action mailed December 21, 2004, in which a three-month Shortened Statutory Period for Response has been set, due to expire March 21, 2005. Eighty-five (85) claims, including four (4) independent claims, were previously paid for in the application. Claims 1-41, 50, 54-55, 74 and 82-83 were cancelled. Claim 97 is newly added. There are now 50 claims pending in the Application, including 4 independent claims. The fee for a one-month extension of time is included herewith.

The Director is authorized to charge any additional fees due by way of this Amendment, or credit any overpayment, to our Deposit Account No. 19-1090. Claims 42-49, 51-53, 56-73, 75-81 and 84-97 are pending. A Request for Continued Examination is filed concurrently herewith.

With regard to claims 42-43, 46-73, 75-81 and 84-85, Applicants previously elected species A, electrospray. With regard to claims 42-69, 73, 75-81 and 84-85, Applicants previously elected Species B, sugars. Claim 70 is within the scope of claim 42 and was unelected. Thus, claim 70 has not been examined. In the event claim 42 is determined to be allowable, Applicants respectfully request that claim 70 be examined for its full scope.

The Examiner noted an apparent scanning error in the official copy of claim 85 of the amended claims. In accordance with the Examiner's suggestion, claim 85 has been amended to delete a dash in the second line in front of "a controlled."

The Claims Comply With 35 U.S.C. § 112

The Examiner rejected claims 49 and 87 under 35 U.S.C. § 112, second paragraph as being indefinite. Applicants respectfully traverse the Examiner's rejection. However, Applicants have amended claim 49 in accordance with the Examiner's comments. In addition, Applicants have amended claim 87 to clarify that a portion of the object is manipulated through a vacuum-to-air differentially pumped interface during the depositing of ionized molecules.

The Examiner noted that the "first chamber" and "second chamber" references in claim 88 implied an order, but in view of claim 89 would not be interpreted as requiring an order.

The Examiner rejected claims 42-53, 56-69, 71-73, 75-81 and 84-96 under 35 U.S.C. § 112, first paragraph for failing to comply with the written description requirement. Applicants respectfully traverse the Examiner's rejection. Initially, Applicants note that the Examiner incorrectly states that the Applicant failed to cite any support in the specification for the prior amendments.

With regard to claims 42-53, 56-69, 71-73, 75-81 and 84-87, the basis for the Examiner's rejection appears to be the reference to a beam of molecules in claim 42. Applicants previously pointed to page 6, lines 10-22 of the specification as originally filed and contend that a beam is inherently disclosed therein. Applicants further call the Examiner's attention to page 1, lines 23-25, page 4, lines 23-25, page 6, lines 23-29, page 7, lines 20-21 ("The RF voltage on the ion guide serves to confine the ions to the center of the multipole ion guide 340."). Accordingly, Applicants respectfully submit that claim 42, as well as claims 43-44, 47-53, 56-69, 71-73, 75-81 and 84-87 comply with the written description requirement.

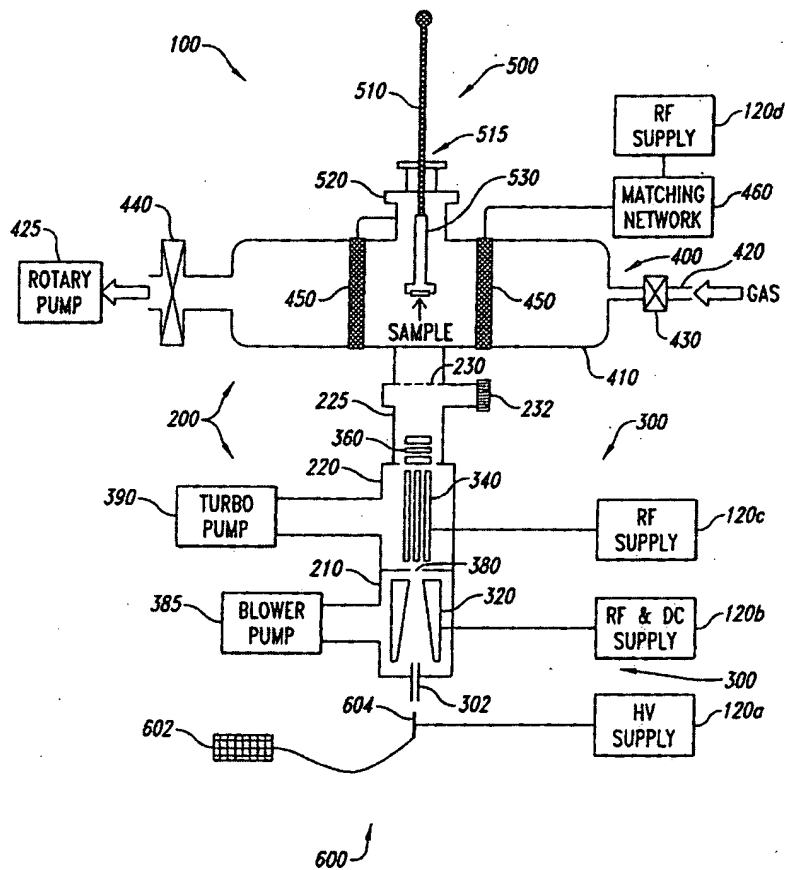
The Examiner suggests that a beam might be disclosed with respect to the use of electrospray ionization as a source of molecules in an ionized state, but is not disclosed with respect to other sources of ions. Applicants respectfully disagree. One of skill in the art would have recognized from the discussion of ion optics in the specification as originally filed that Applicants were referring to generating a beam of molecules in an ionized state, without regard to the source of the ionized molecules. See U.S. Patent No. 6,107,628 issued to Smith, et al., at Column 4, lines 24-57 (The funnel lens controls "the size and shape of a beam or cloud of charged particles (such as ions) directed through the ion funnel. ... Charged particles driven through the ion funnel are thus focused into a charge particle beam at the exit of the ion funnel. Ions so effected can be said to be 'trapped' or 'directed' by the ion funnel"). U.S. Patent No. 6,107,628 is disclosed and included by reference in the specification as originally filed on page 6, lines 23-24.

While Applicants have amended claim 42, Applicants respectfully submit that claims 42-53, 56-69, 71-73, 75-81 and 84-87, prior to the amendment of claim 42, were supported by the specification as originally filed.

With regard to claims 87-92, the Examiner first contends that no disclosure of an apparatus that has separate chambers for plasma treating and depositing ionized molecules was found. Applicants respectfully traverse the Examiner's rejection. The specification as originally filed recites:

In the embodiment shown in Figure 2, an ion deposition chamber 225 is between the ion guide chamber 220 and a plasma reactor chamber 410. The ion deposition chamber 225 may be closed-off from the plasma reactor chamber through the use of a gate 230 operable by a gate valve 232.

Page 8, lines 5-8. The separate chambers are clearly illustrated in Figure 2, reproduced below for convenience. See also Figure 1.



*Fig. 2*

Figure 2 From Specification As Filed

Accordingly, Applicants respectfully submit that an apparatus having separate chambers for plasma treatment and ion deposition was disclosed.

The Examiner also contends that no disclosure of introducing a portion of an object into a vacuum system was found. Applicants respectfully traverse the Examiner's contention. The specification as originally filed refers to positioning "the surface of the object to be treated" using the target guiding system and to introducing and removing objects of irregular designs through air-to-vacuum-to-air interfaces, such objects including vacular grafts, stents, and sutures. See page 9, lines 1-10 and page 9, line 24 through page 10, line 11. Accordingly,

Applicants respectfully submit that claims 87-92 are supported by the specification as originally filed.

With regard to claims 93-94, the Examiner contends that there is no teaching of depositing "intact" large molecules. Applicants respectfully traverse the Examiner's contention. The specification as originally filed included Figure 6, which illustrates a layer 924 of molecules deposited on a surface 922 of an object 920. See Figure 6 and the description thereof on page 11, lines 5-8. Figure 6 is not described in terms of a deposited layer of portions of molecules. Accordingly, Applicants respectfully submit that claims 93-94 are supported by the specification as filed.

With regard to claims 95-96, the Examiner contends that generating ionized molecules in a gas and separating the ionized molecules from the gas is not disclosed. Applicants respectfully traverse the Examiner's contention. As an initial matter, the Examiner appears to contend that a particular embodiment is not disclosed. Applicants are not required to disclose all potential embodiments to meet the written description requirement. In any event, ionizing molecules in a gas using various methods is disclosed in the specification as originally filed. See, e.g., page 1, lines 9-25. The specification goes on to describe separating the ionized molecules from undesired gases to produce a beam of ionized molecules. See page 6, lines 14-15, page 7, lines 9-21, page 9, lines 9-11. Accordingly, Applicants respectfully submit that claims 95-96 are supported by the specification as filed.

#### The Claims Are Not Anticipated Or Rendered Obvious by Andra

The Examiner rejected claims 42-43, 46, 56-57, 68, 76, 79-80 and 86 under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 5,645,897 issued to Andra. The Examiner similarly rejected claims 47-48, 51, 52, 58, 61-64, 75-76, 78, 87 and 93-96 under 35 U.S.C. § 103(a) as rendered obvious by Andra, without citing a secondary reference. Applicants respectfully traverse the Examiner's rejections. Andra does not anticipate the claims and is not an appropriate primary reference.

Disclosed embodiments of the invention will now be discussed in comparison to the applied reference. Of course, the discussion of the disclosed embodiments and the subject

matter described in the applied reference do not define the scope or interpretation of any of the claims. Instead, such discussed differences merely help the Examiner to appreciate important claim distinctions discussed thereafter.

The exemplary embodiments of Applicants invention are directed, among other things, to plasma treating and deposition of molecules on the surface of an object in a vacuum system. The surface is first plasma treated in the vacuum system to prepare the surface for the deposition of the ionized molecules. The surface is cleaned and oxidized with oxygen plasma. The creation of an oxidized layer prepares the surface to support discharge of ionized molecules. The molecules must be deposited in a timely manner, that is, before their activity is destroyed. Thus, a beam of the molecules in an ionized state is directed at the surface in the vacuum system. The purity of the ionized molecules in the beam is high, that is, the beam is substantially free of solvent. The energy of the ionized molecules in the beam is controlled to facilitate deposition of intact molecules in the beam on the surface of the object.

Andra discloses a process for using a beam of ionized molecules to supply energy for use in etching the surface of an object or depositing films on the surface of the object, the films are formed from atoms or molecules from a reactive gaseous fluid surrounding the surface of the object. The ion beam supplying the energy is reflected, preferably before striking the surface of the object. See Andra, Abstract, Column 1, lines 8-17, and Column 3, lines 49-65.

Independent claim 42 as amended recites: "depositing the molecules on the surface of the object in the vacuum system by directing a substantially solvent-free beam comprising the molecules in an ionized state at the surface of the object." Applicants note that independent claim 88, as amended, contains similar language. Andra does not teach or suggest depositing ionized molecules on the surface of an object by directing a beam comprising the ionized molecules at the surface of the object because any film deposited on the surface of the object in Andra consists of atoms or molecules formed from the gaseous fluid surrounding the object. Accordingly, Applicants respectfully submit that claim 42, and claims 43, 46-48, 51-52, 56-58, 61-64, 68, 75-76, 78-80 and 86-87 that depend from claim 42, are not anticipated or rendered obvious by Andra.

Independent claim 93 as amended recites: “depositing substantially pure, intact molecules on the surface of the object in the vacuum system by directing the substantially pure, intact molecules in an ionized state at the object in the absence of a plasma; and controlling a kinetic energy level of the substantially pure, intact ionized molecules directed at the object.” As discussed above, Andra does not teach or suggest depositing molecules on the surface of an object by directing the molecules in an ionized state at the object. Accordingly, Applicants respectfully submit that claim 93, and claims 94 and 97 that depend from claim 93, are not anticipated or rendered obvious by Andra.

Independent claim 95 as amended recites: “depositing the molecules on the surface of the object by: ionizing the molecules in a gas; separating the ionized molecules from the gas to produce a beam of ionized molecules in the vacuum system; controlling a kinetic energy level of the ionized molecules in the beam; and directing the beam of ionized molecules at the surface of the object in the vacuum system.” Accordingly, for the reasons discussed above, Applicants respectfully submit that claim 95, and claim 96 that depends from claim 95, are not anticipated or rendered obvious by Andra.

The Claims Are Not Anticipated Or Rendered Obvious by Noda, et al.

The Examiner rejected claims 42, 46, 56, 61, 67 and 80 under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 5,374,613 issued to Noda, et al. The Examiner similarly rejected claims 47-48, 51-52, 62-63, 77-78, 87 and 95-96 under 35 U.S.C. § 103(a) as rendered obvious by Noda, without citing a secondary reference. Applicants respectfully traverse the Examiner’s rejections. Noda does not anticipate the claims and is not an appropriate primary reference.

The exemplary embodiments of Applicants’ disclosure are discussed above. Noda discloses a process for using a beam of ionized molecules to supply constituent components of a film that is to be deposited on the surface of an object. The beam strikes the surface of the object in the presence of oxygen, which leads to the deposit of a thin oxide film on the surface of the object. See Noda, Abstract, Column 8, line 64 through Column 9, line 4. In Noda, the deposited molecules are no longer intact.

Applicants respectfully submit that Noda does not anticipate or render obvious independent claims 42 and 95 because in Noda molecules from the beam of ionized molecules are not deposited on the surface of the object. Claims 46-48, 51-52, 56, 61-63, 67, 77-78, 80 and 87 depend from claim 42 and claim 96 depends from claim 95. Accordingly, Applicants respectfully submit that claims 42, 46-48, 51-52, 56, 61-63, 67, 77-78, 80, 87, and 95-96 are not anticipated or rendered obvious by Noda.

The Claims Are Not Rendered Obvious by Galin, et al., In View of Morozov, et al.

The Examiner rejected claims 42-43, 45-49, 51-53, 56-65, 67-69, 71-73, 75-81, 84-87 and 93-96 under 35 U.S.C. § 103(a) as rendered obvious by U.S. Patent 5,944,753 issued to Galin, et al. in view of U.S. Patent No. 6,350,609 issued to Morozov, et al. Applicants respectfully traverse the Examiner's rejections.

As an initial matter, the Examiner has taken the position that any reference using electrospray discloses a beam of ionized molecules. Applicants respectfully note that whether or not electrospray discloses a beam of ionized molecules is not the issue. The claims do not simply recite "a beam of ionized molecules." Nevertheless, Applicants respectfully contend that an electrospray is not equivalent to a beam. Electrospray alone cannot produce a beam of molecules in an ionized state because the large electric fields at the point of spray disperse the ionized molecules in many directions. In contrast, a beam is confined. For example, see, Merriam-Webster's Collegiate Dictionary 99 (10th ed. 1998) ("beam ... a collection of nearly parallel rays (as X rays) or a stream of particles (as electrons)"). When electrospray is the source of the ionized molecules, a vacuum system and ion optics are required to produce a beam.

The exemplary embodiments of Applicants' disclosure are discussed above. Galin discloses a process for plasma treating the surface of an ocular implant to generate a plasma-treated surface having constituents selected from the group consisting of amines, carboxylic acids, active free radicals and passive free radicals. Thereafter, a sulfated polysaccharide medicament coating is bonded to the implant. The coating is preferably bonded to the implant by means of ionic attraction, hydrogen bonding, or covalent bonding, with covalent bonding being particularly preferred. The coating techniques of Galin are immersion



coating and spray coating using a suitable solution or dispersion of the medicament dissolved or dispersed in an appropriate solvent or dispersant with a conventional concentration of the medicament. The implant is then dried.

Morozov discloses the use of electrospray to deposit molecules on a substrate. While Morozov discusses “wet” and “dry” electrospray, Morozov states that “biomacromolecules are deposited as single dry molecules only if their concentration in solution is below a critical threshold of about  $10^{-3}$  to  $10^{-5}$  mg/ml.” Morozov teaches away from substantially solvent-free electrospray (i.e., electrospray where the molecules of interest are separated from the solvent), because, when Morozov’s methods are used, nanoclusters form opaque porous films on the substrate, instead of forming deposits of single molecules. See Figure 15 of Morozov and the description thereof at Column 15, lines 4-18. Thus, Morozov teaches electrospray of molecules with solvent followed by drying steps after deposition of the molecules on the surface.

The Examiner points to Galin as disclosing plasma treatment spray coating and to Morozov as disclosing electrospray. The Examiner does not point to any suggestion in either Galin or Morozov for combining plasma treating of an object in a vacuum system with depositing molecules by directing a beam of molecules in an ionized state at the object in the vacuum system as claimed. See MPEP 2143.01. The Examiner instead uses hindsight to argue that the improved efficiency of the claimed process renders it obvious. In addition, both Galin and Morozov teach away from the claimed method. Galin does not mention electrospray and specifically indicates the molecules must be dissolved in a solvent or dispersant to be deposited. Morozov teaches that substantially solvent-free electrospray is an undesirable method of depositing molecules. Accordingly, Applicants respectfully submit that claims 42-43, 45-49, 51-53, 56-65, 67-69, 71-73, 75-81, 84-87 and 93-96 (as well as new claim 97) are not rendered obvious by Galin in view of Morozov.

The Claims Are Not Rendered Obvious by Hostettler, et al., In View of Morozov, et al.

The Examiner rejected claims 42-43, 45-49, 51-53, 56-69, 71-73, 75-81, and 84-96 under 35 U.S.C. § 103(a) as rendered obvious by U.S. Patent 5,894,368 issued to Hostettler, et al. in view of Morozov. Applicants respectfully traverse the Examiner's rejections.

As Applicants noted in response to a previous Office Action, Hostettler is not an appropriate primary reference. Hostettler does not teach or suggest depositing molecules on the surface of the object in the vacuum system by directing a beam of the molecules in an ionized state at the object. One of skill in the art would not be motivated to combine the glow-discharge plasma-treating of Hostettler with directing a beam of ionized molecules at the object because the plasma would change the characteristics of the ionized molecules. Hostettler further teaches away from the present invention because it teaches that molecules are deposited on the object by successive plasma treatments. There is no suggestion in Hostettler that the second plasma treatment should be replaced with directing a beam of ionized molecules at the object. Further, modifying Hostettler in this fashion would change the principles of operation of Hostettler, which includes polymerization of molecules in a plasma. Modifying the principals of operation of a reference means that the modification is not obvious. See MPEP 2143.01. Applicants also note that the cited portions of Hostettler do not appear to generally suggest spraying, as contended by the Examiner. Morozov, as discussed above, also teaches away from the claimed invention. With regard to claim 88 and claims 89-92 that depend from claim 88, claim 88 as amended recites "depositing the molecules on the surface of the first portion of the object in a second treatment chamber of the vacuum system by directing a substantially solvent-free beam of the molecules in an ionized state at the surface." In addition, Applicants traverse the Examiner's unsupported assertion that it would be obvious to treat elongated structures by pulling the structures through the various treatment stages. Moreover, the Examiner does not contend it would be obvious to employ first and second treatment chambers, as also recited in claim 88. Accordingly, Applicants respectfully submit that claims 42-43, 45-49, 51-53, 56-69, 71-73, 75-81, and 84-97 are not rendered obvious by Hostettler in view of Morozov.

The Claims Are Not Rendered Obvious by Ragheb, et al., In View of Morozov, et al.

The Examiner rejected claims 42-49, 51-53, 56-69, 71-73, 75-81, and 84-96 under 35 U.S.C. § 103(a) as rendered obvious by U.S. Patent 5,824,049 issued to Ragheb, et al. in view of Morozov. Applicants respectfully traverse the Examiner's rejections.

The exemplary embodiments of Applicants' disclosure are discussed above. Ragheb discloses a process for covering a bioactive material with a porous layer. Ragheb provides no details regarding the process for depositing the bioactive material, other than to tersely suggest plasma treatment, vapor-phase deposition, spraying, and dipping. When discussing spraying and dipping, Ragheb provides as an example that: "a polymer solution may be applied to the stent and the solvent allowed to evaporate." Ragheb, Column 12, lines 30-36. Ragheb is not any more instructive than Hostettler and, like Hostettler, teaches away from the claimed methods. Moreover, Ragheb is in a different class than the elected claims, and in a different class than Morozov. Thus, Ragheb is not an appropriate primary reference. Morozov, as discussed above, teaches away from the use of substantially solvent-free deposition of molecules. Moreover, with regard to claims 88 and 89-92 that depend from claim 88, the Examiner provides no support for the contention that it would be obvious to treat elongated structures by pulling the structures through the various treatment stages. Moreover, the Examiner does not contend it would be obvious to employ first and second treatment chambers, as recited in claim 88. Accordingly, Applicants respectfully submit that claims 42-49, 51-53, 56-69, 71-73, 75-81, and 84-97 are not rendered obvious by Ragheb, et al. in view of Morozov.

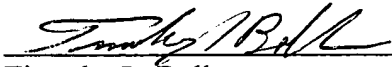
All of the claims remaining in the application are now allowable. Favorable consideration and a Notice of Allowance are earnestly solicited. In the event the Examiner disagrees or finds minor informalities, Applicant respectfully requests a telephone interview to discuss the Examiner's issues and to expeditiously resolve prosecution of this application. Accompanying this Amendment is an Applicant Initiated Interview Request form in the event the Examiner does not agree that the claims are allowable over the cited references.

In closing, Applicant respectfully requests the Examiner to enter these amendments and to reconsider this application and its early allowance. The Director is

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Reply to Office Action dated December 21, 2004

authorized to charge any additional fees due by way of this Amendment, or credit any overpayment, to our Deposit Account No. 19-1090.

Respectfully submitted,  
SEED Intellectual Property Law Group PLLC

  
\_\_\_\_\_  
Timothy L. Boller  
Registration No. 47,435

TLB:jr

Enclosure:  
Postcard

701 Fifth Avenue, Suite 6300  
Seattle, Washington 98104-7092  
Phone: (206) 622-4900  
Fax: (206) 682-6031

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